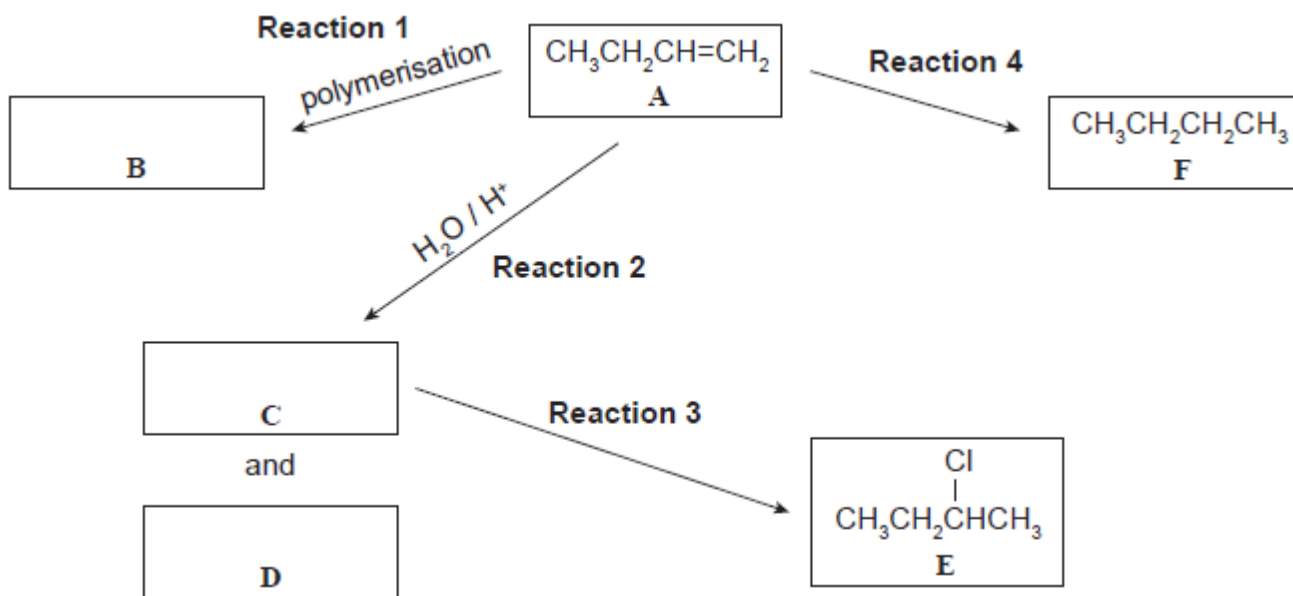


## Reactions flow charts

1) But-1-ene is used in the reaction sequence shown below.



(a) (i) Draw two repeating units of the polymer, B, formed in **Reaction 1**.

(ii) Give the name or formula of a suitable reagent in **Reaction 4**; include any specific conditions required.

(iii) Give the name or formula of a suitable reagent in **Reaction 3**; include any specific conditions required.

(b) Can compound A exist as geometric (*cis-trans*) isomers?

Justify your answer, including reference to the requirements for geometric (*cis-trans*) isomers.

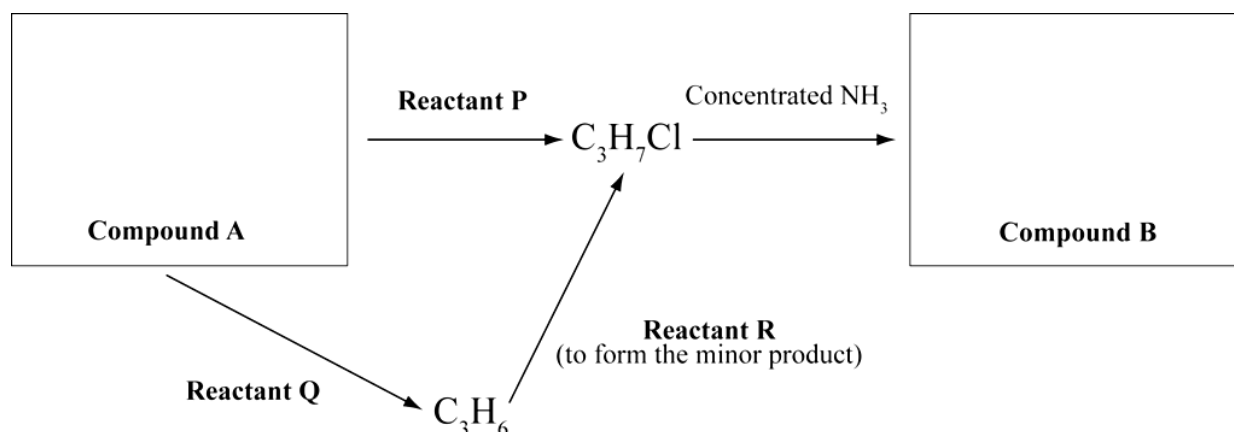
(c) (i) Draw the structural formulae of the organic molecules C and D, formed in **Reaction 2**, in the boxes below.

(ii) Elaborate on the reaction occurring in **Reaction 2**.

In your answer you should include:

- identification of the major and minor products
- an explanation of why there are two possible products
- justification of your placement of the different structures in boxes C and D with reference to the reaction sequence.

2 a) The flow diagram below shows some reactions involving organic substances.



Compound A has a molecular formula  $C_3H_8O$ . It reacts readily with acidified potassium dichromate solution. Write the structural formula of Compound A in the box in the flow diagram above.

b) Use the information from the flow diagram in (a) to:

i) Write the structural formulae for Compound B in the box in the flow diagram above.

ii) Write the name OR formula of Reactant P, Reactant Q, and Reactant R. State any conditions for the reaction to occur

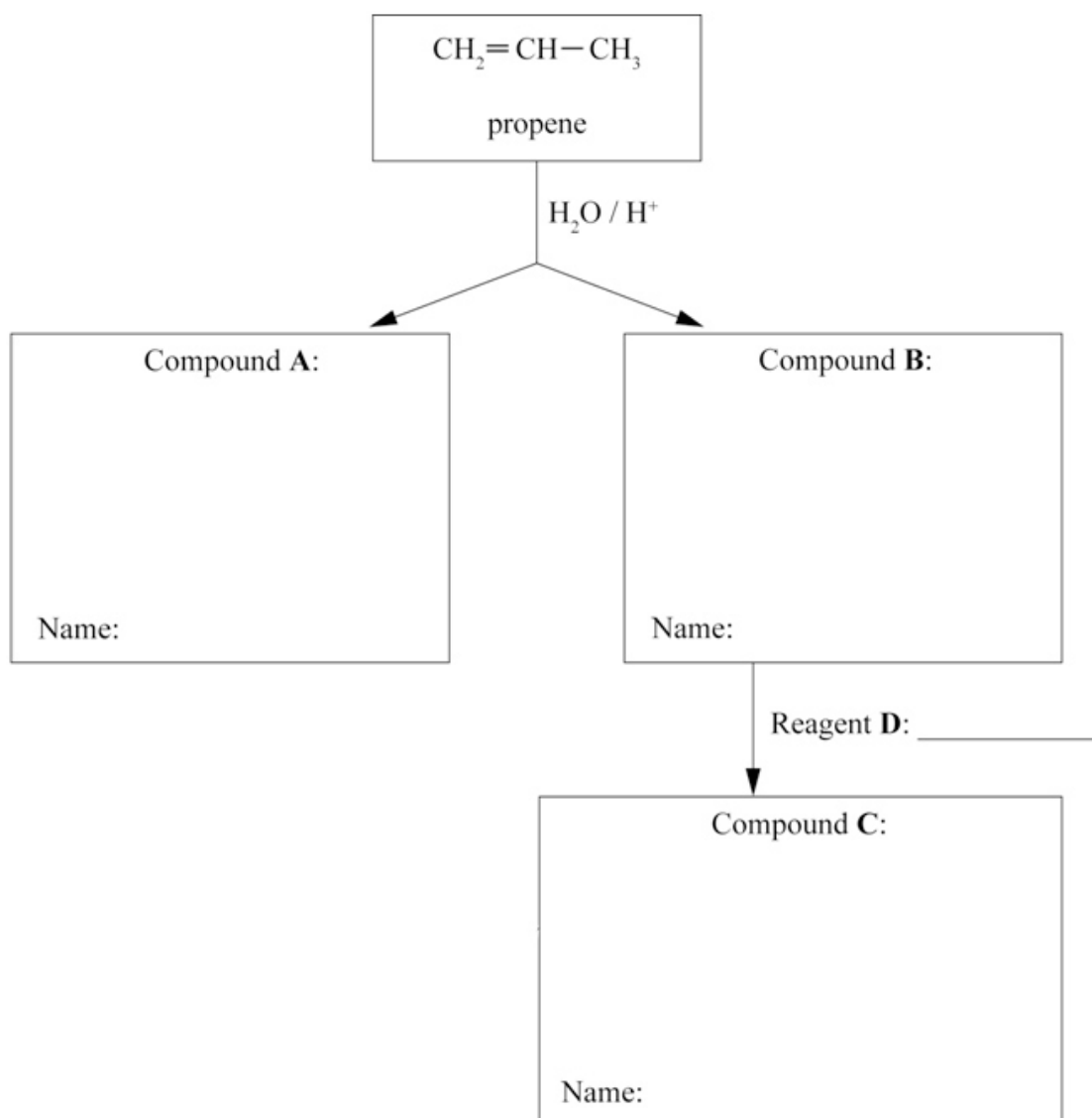
c) i) The types of reactions in the flow diagram above can be described as addition, elimination, or substitution reactions.

Allocate these reaction types to each of the four reactions occurring in the flow diagram

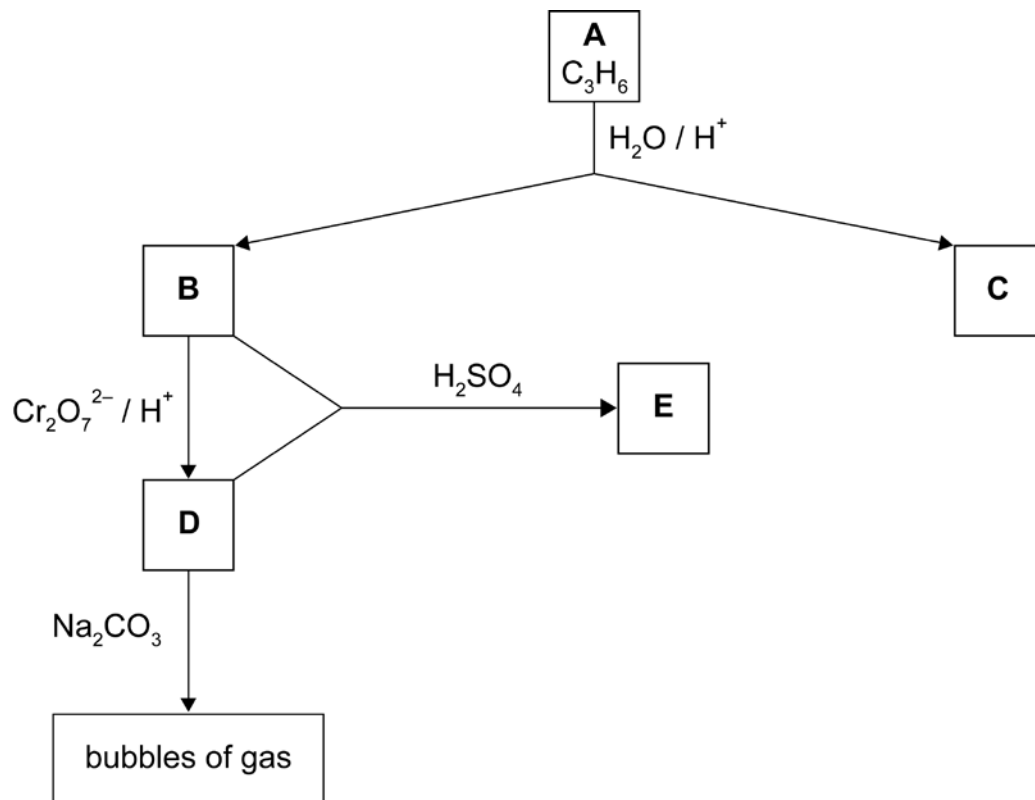
- |  |                |
|--|----------------|
| 1) Compound A $\rightarrow$ $C_3H_7Cl$ | Reaction type: |
| 2) $C_3H_7Cl \rightarrow$ Compound B   | Reaction type: |
| 3) Compound A $\rightarrow$ $C_3H_6$   | Reaction type: |
| 4) $C_3H_6 \rightarrow$ $C_3H_7Cl$     | Reaction type: |

ii) Compare and contrast the similarities and differences between addition, elimination, and substitution reactions. You should use the examples of the reactions from (c) (i) in your answer

3) The flow diagram below shows a series of organic reactions. Complete the diagram by drawing **structural formulae** and writing **IUPAC (systematic) names** for the compounds **A**, **B** and **C** (which turns litmus red), and identifying reagent **D**.



4) An unsaturated compound **A**,  $C_3H_6$ , reacts with water under acidic conditions to form two new products, **B** and **C**. Product **B** reacts with acidified potassium dichromate solution to form **D**. Product **D** reacts with a solution of sodium carbonate producing bubbles of gas. Product **B** reacts with **D** in the presence of sulfuric acid and compound **E** is formed. Compound **E** has a characteristic smell.



Write down the structural formula and name for each compound **A**, **B**, **C**, **D** and **E**.